CLAIMS

1. A method of making a fiber, the method comprising:

providing a first component comprising water, wherein the first component has a first evaporation rate;

providing a second component comprising a polymer dissolved in a solvent, wherein the second component has a second evaporation rate, provided that the second evaporation rate is higher than the first evaporation rate;

combining the first component, the second component to make an emulsion;

applying a force to the emulsion; and

extruding the emulsion to make the fiber, wherein the fiber has an outer surface, an internal cavity and a diameter of at most 10 micrometers.

2. The method of claim 1, wherein the first component comprises at most 20 vol. % of the emulsion.

3. The method of claim 1, wherein the first component comprises from about 5 to about 20 vol. % of the emulsion.

4. The method of claim 1, wherein the first component comprises from about 2 to 5 vol. % of the emulsion.

5. The method of claim 1, wherein the second component comprises at least 80% of the emulsion.

6. The method of claim 1, wherein the first component comprises glycerol and poly(vinyl alcohol).

7. The method of claim 1, wherein the polymer is a member selected from the group consisting of poly(styrene), poly(urethane), poly(lactic acid), poly(glycolic acid), poly(ester), poly(alpha-hydroxy acid), poly(ε-caprolactone), poly(dioxanone), poly(orthoester), poly(ether-ester), poly(lactone), poly(carbonate), poly(phosphazene), poly(phosphanate), poly(ether), poly(anhydride), mixtures thereof and copolymers thereof.

8. The method of claim 1, wherein the solvent is a member selected from the group consisting of methylene chloride, chloroform, ether, hexane, pentane, petroleum ether, cresol, dichloroethane, ethyl acetate, methyl ethyl ketone, dioxane, propylene carbonate, and butyl acetate.

9. The method of claim 1, further providing a third component, said third component is being a member selected from the group consisting of a biomolecule, a cell, a particle, and a gel.

10. The method of claim 9, wherein the biomolecule is a member selected from the group consisting of a bioactive polypeptide, a polynucleotide coding for the bioactive polypeptide, a cell regulatory small molecule, a peptide, a protein, an oligonucleotide, a nucleic acid, a poly(saccharide), an adenoviral vector, a gene transfection vector, a drug, and a drug delivering agent.

11. The method of claim 9, wherein the cell is a member selected from the group consisting of chondroblast, chondrocyte, fibroblast, an endothelial cell, osteoblast, osteocyte, an epithelial cell, an epidermal cell, a mesenchymal cell, a hemopoietic cell, an embryoid body, a stem cell, and dorsal root ganglia.

12. The method of claim 9, wherein the particle is a colloidal particle or a solid particle.

13. The method of claim 12, wherein the colloidal particle has a diameter of about 3nm to about 10 micrometers and said colloidal nanoparticle is a member selected from the group consisting of a polymer, an oxide, a nitride, a carbide, calcium silicate, calcium phosphate, calcium carbonate, a carbonaceous material, a metal, and a semiconductor.

14. The method of claim 12, wherein the solid particle has a diameter of about 3nm to about 10 micrometers and said solid nanoparticle is a member selected from the group consisting of a polymer, an oxide, a nitride, a carbide, calcium silicate, calcium phosphate, calcium carbonate, a carbonaceous material, a metal, and a semiconductor.

15. The method of claim 9, wherein the surfactant is a member selected from the group consisting of PLURONIC, polyvinyl alcohol, poly(sorbate), oleyl alcohol, glycerol ester, sorbitol, carboxy methoxy cellulose, sodum dodecyl sulfonate, sodum dodecyl benzene sulfonate, oleic acid, albumin, ova-albumin, lecithin, natural lipids, and synthetic lipids.

16. The method of claim 1, wherein the emulsion comprises water, poly(lactic acid), poly(vinyl alcohol) and optionally a silicone oxide nanoparticle comprising a biomolecule.

17. The method of claim 1, wherein the fist component and the second component are provided at a ratio, wherein the ratio is adapted to affect morphology of the fiber.

18. The method of claim 17, wherein the morphology is a member selected from the group consisting of flat fiber, round fiber, porous fiber and a combination thereof.

19. A fiber manufactured by the method of claim 1.

20. The fiber of claim 19, wherein the emulsion comprises water, poly(lactic acid), and optionally a nanoparticle comprising silicone oxide and the biomolecule.

21. The fiber of claim 21, wherein the diameter is about 3 nm to 10 micrometers.

22. In a method of making a fiber by electrospinning wherein the fiber is formed by extruding a fiber-forming medium from a vessel through an orifice under influence of a force, the improvement wherein the fiber-forming medium comprises an emulsion including (1) a first component comprising water, the first component is provided in an amount of at most 20 vol. %, and (2) a second component comprising a polymer, the second component is provided in an amount of at least 80 vol. %, on a condition that the first component has a first evaporation rate and the second component has a second evaporation rate and wherein the second evaporation rate is higher than the first evaporation rate.